

**BIOLOGICAL OPINION
ON THE IMPACTS OF THE
JOSEPH A. PICCONE, INC./TRI-COUNTY MALL
ON THE BOG TURTLE AT A
38-ACRE TRACT IN CAERNARVON TOWNSHIP,
BERKS COUNTY, PENNSYLVANIA**

May 4, 2001

**U.S. Fish and Wildlife Service
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801**

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CONSULTATION HISTORY

On July 6, 1992, the Corps of Engineers-Baltimore District authorized under Nationwide Permits 12 and 26 (CENAB-OP-RR-91-02483-4) impacts to 0.59 acre of wetlands and waters of the United States associated with the construction of the Joseph A. Piccone, Inc./Tri-County Mall. According to Caernarvon Township records, the 38.09-acre tract was purchased by Joseph A. Piccone in 1988. The project was not completed prior to the expiration date of the Corps' authorization, which occurred on July 6, 1994. On March 16, 1994, the Baltimore District reauthorized under Nationwide Permits 12 and 26 (CENAB-OP-RR-94-00391-4) impacts to 0.59 acre of wetlands and waters of the United States associated with project construction. Although the applicant had extended utilities infrastructure to the site in 1993 (e.g., an existing 8-inch water line and sewer line terminate at the southeastern edge of the project area; M. L. Templin, Tri-County Mall Project Manager, pers. comm.; March 11, 2001), the project was not completed by March 16, 1996, and the Corps' authorization was once again allowed to expire. There is no record of Endangered Species Act section 7 consultation having occurred on these Nationwide Permits.

In response to the applicant's January 20, 2000, request, biologist Michael Danko of the Corps Baltimore District visited the project area on April 14, 2000, to verify the wetland delineation and determine the extent of Corps jurisdiction pursuant to section 404 of the Clean Water Act (33 U.S.C. 1344). During this field investigation, and with the applicant and consultants present, Mr. Danko observed a spring-fed wetland with the soft, mucky soils and emergent vegetation (e.g., rice cut-grass, jewelweed, cattails, and various sedges and rushes) typical of bog turtle habitat. At that time, the applicant was advised to contact the Fish and Wildlife Service to resolve potential endangered species conflicts. During a May 30, 2000, meeting of the State's Environmental Review Committee in Harrisburg, with the applicant and consultants present, concerns regarding the potential presence of bog turtles within the project area were again raised by Mr. Danko, who reiterated his request that the applicant contact the Service. The Service was subsequently provided a May 2000 Addendum #1 to the subject permit application, which included a detailed description of the sources of hydrology and a revised wetlands map, dated May 24, 2000.

On June 6, 2000, the applicant's consultant contacted the Service to request information regarding the Service's bog turtle survey protocol. In response to this request, the applicant's consultants were provided via facsimile a copy of the Service's *Guidelines for Bog Turtle Surveys* (May 11, 1998, revision) and a list of recognized, qualified bog turtle surveyors. By letter dated June 8, 2000, the Service requested that the applicant conduct a bog turtle survey as described under Step 3 of the *Guidelines* if direct or indirect adverse effects to all on-site wetlands could not be avoided. Field surveys conducted by Gian L. Rocco on June 8 and June 17, 2000, confirmed the presence of one adult female bog turtle, aged approximately 9 years, within the largest (3.139 acres) of five palustrine emergent wetlands proposed to be affected by the project. The purpose of this survey effort was only to determine presence or probable absence of the species; the survey was not of sufficient intensity or

duration to determine population size, density or structure. In addition, Mr. Rocco did not assess four of the five on-site wetlands (0.1 acre each) for their potential to support bog turtles.

On July 6, 2000, Service biologists and a representative of the Pennsylvania Fish and Boat Commission's Nongame and Endangered Species Unit conducted a field investigation of the project area to determine the potential for previously unsurveyed wetlands to support bog turtles, and for adverse effects to bog turtles due to the proposed development. Also present for this field meeting were representatives from the Corps of Engineers - Baltimore District, the Environmental Protection Agency, the Pennsylvania Department of Environmental Protection (PADEP), and the applicants and their consultants. Potential alternatives to avoid and minimize adverse effects to the bog turtle were also discussed during this meeting.

During preparation of the biological assessment (BA) for this project, the applicant's consultants and the Corps met with the Service on October 25 and November 6, 2000. During these meetings, and in an August 4, 2000, letter to the applicant, the Service requested that the applicant evaluate alternative construction proposals which would avoid or minimize adverse effects to bog turtles and their habitat. During these meetings, the Service also explained that if adverse effects could not be avoided, formal consultation would be required. This was qualified, however, by our statement that formal consultation should only occur on the project alternative which would minimize adverse effects to the bog turtle to the maximum extent possible, as mutually agreed upon by the Service and Corps. Despite these requests, the applicant has made few substantive modifications to the original design that would minimize adverse effects to the species, and the Corps chose to formally consult on the applicant's project, as proposed.

During the October 25 meeting, the Service also advised the Corps and applicant that it would be prudent to delay initiation of formal consultation until the site had been intensively surveyed for bog turtles during the 2001 survey window to obtain better information about population size and structure. We explained that this information could assist the Service in developing its jeopardy/ non-jeopardy determination, and perhaps more importantly, in formulating its reasonable and prudent measures. Because the applicant was concerned about the delays associated with waiting for these survey results, the Service was advised that formal consultation should proceed without this information, and that we should assume the "worst case scenario" (i.e., err on the side of the species).

On November 22, 2000, the Corps submitted their BA for the subject project to the Service, along with a request to initiate formal consultation. By letter dated December 11, 2000, the Service notified the Corps that the biological assessment package was incomplete, since it lacked detailed information about the project's proposed off-site conservation measures and their effect on bog turtles. Specifically, the Service requested that the Corps provide a comprehensive plan detailing the proposed protection of off-site wetlands that support bog turtles. During a January 10, 2001, meeting with the Corps and the applicant, the Service reiterated this request for additional information. To provide for an adequate review period prior to the issuance of this draft biological opinion, the Corps and the

applicant agreed to provide the Service with the requested information by February 10, 2001. Assuming that this information would be provided by February 10, the Service specified that January 10 would be the date on which formal consultation was initiated.

During subsequent communications between the Service, Michael Templin of Joseph A. Piccone, Inc., and Joseph E. Hoffman of the Berks County Conservancy, the participants discussed and agreed upon the terms of the off-site bog turtle habitat compensation plan. Mr. Hoffman provided this additional information to the Service's Pennsylvania Field Office by letter dated February 20, 2001.

The Service delivered a draft biological opinion to the Corps on March 29, 2001, and received written comments on the draft from the Corps on April 16, 2001. After considering these comments, the final biological opinion was transmitted to the Corps on May 4, 2001.

Concurrent Review by Other Agencies

Concurrent with section 7 consultation, the subject action has also been under review by the Corps and the PADEP, pursuant to the Clean Water Act and the PADEP's wetland permitting regulations, respectively.

Although evaluation of proposed permits pursuant to section 404(b)(1) of the Clean Water Act is an integral part of the Corps' evaluation of permit applications, this analysis had not been completed prior to the initiation of formal consultation on the subject project. In other words, the applicant had not demonstrated to the satisfaction of the Corps that no feasible on- or off-site alternatives to the proposed action were available to minimize the anticipated adverse environmental effects. The Corps' analysis was still not completed at the time this final biological opinion was issued.

The objective of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of our Nation's waters" [section 101(a)]. Environmental Protection Agency regulations at 40 CFR 131.12(a)(1) state "Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." According to the EPA's Water Quality Standards Handbook (part 4.4.3; dated September 15, 1993), EPA interprets section 131.12(a)(1) of the antidegradation policy to be satisfied with regard to fills in wetlands if the discharge does not result in "significant degradation" to the aquatic ecosystem as defined under section 230.10(c) of the section 404(b)(1) Guidelines.

The section 404(b)(1) Guidelines are used to determine whether wetland fills significantly degrade an aquatic system. The Guidelines state that the following effects contribute to significant degradation, either individually or collectively -- significant adverse effects on:

1. Human health or welfare, including effects on municipal water supplies, plankton, fish, shellfish, wildlife, and special aquatic sites (e.g., wetlands);

2. the life stages of aquatic life and other wildlife dependent on aquatic ecosystems, including transfer, concentration, or spread of pollutants or their byproducts beyond the site through biological, physical, or chemical process;
3. ecosystem diversity, productivity, and stability, including loss of fish and wildlife habitat or loss of the capacity of a wetland to assimilate nutrients, purify water, or reduce wave energy; or
4. recreational, aesthetic, and economic values.

Pennsylvania has adopted stricter antidegradation standards for wetlands than the Corps. For example, on July 16, 1999, the PADEP promulgated more stringent antidegradation regulations related to the protection of State- and federally listed species and critical habitat at 25 Pa. Code §93.4. The language under §93.4c sets forth specific implementation requirements for the antidegradation program. In particular, paragraph (a)(2) provides existing use protection for endangered species. The language of this paragraph provides that the Department will ensure protection of Pennsylvania and Federal threatened and endangered species and their critical habitat if it has confirmed the presence, critical habitat, or critical dependence of such species in or on a surface water.

More specific restrictions on protection of Exceptional Value Waters are described under §93.4c(b). For example, according to language at paragraph (1)(i), clause (A), a person proposing a new, additional or increased discharge to High Quality or Exceptional Value Waters, shall evaluate nondischarge alternatives to the proposed discharge and use an alternative that is environmentally sound and cost-effective when compared with the cost of the discharge. If a nondischarge alternative is not environmentally sound and cost-effective, a new, additional or increased discharge shall use the best available combination of cost-effective treatment, land disposal, pollution prevention and wastewater reuse technologies. Under clause (B), a person proposing a new, additional or increased discharge to High Quality or Exceptional Value Waters, who has demonstrated that no environmentally sound and cost-effective nondischarge alternative exists under clause (A), shall demonstrate that the discharge will maintain and protect the existing quality of receiving surface waters, except as provided in subparagraph (iii) [subparagraph (iii) addresses High Quality Waters only, and is not related to Exceptional Value Waters].

Furthermore, according to §93.4a(d) of the Commonwealth's antidegradation regulations, the water quality of "Exceptional Value Waters" shall be maintained. Under §93.4b(b), a surface water qualifies as an Exceptional Value Water if it is a surface water of "exceptional ecological significance." A surface water of exceptional ecological significance is defined at §93.1 as a surface water which is important, unique or sensitive ecologically, but whose water quality as measured by traditional parameters (for example, chemical, physical or biological) may not be particularly high, or whose character cannot be adequately described by these parameters. These waters include [under (ii)] wetlands which are

Exceptional Value wetlands under §105.17(1). However, it is a combination of the Chapter 93 and 105 regulatory requirements protecting listed species and their habitats which sets forth limited conditions for impacts to Exceptional Value wetlands that direct the Department's review of permit applications.

In May 9, May 19, and June 16, 2000, "pre-denial" letters to the applicant from Raymond P. Zomok, PADEP Soils & Waterways Section Chief at the Southcentral Regional Office, the PADEP identified significant deficiencies in the subject permit application. For example, Item 4 of the June 16 letter states that if it is "determined that on-site wetlands are Exceptional Value wetlands, bridges would be the only acceptable structures" for the two wetland crossings. The applicant was requested to provide revised plans illustrating the proposed changes to the wetland crossings. In December 13, 2000, and January 31, 2001, letters to the Service's Pennsylvania Field Office, Mr. Zomok stated that PADEP will extend the time limit for the applicant to respond to PADEP's June 16 pre-denial letter, and take no action on this application until after April 3, 2001.

According to a September 18, 2000, "pre-denial" letter to the applicant's counsel, Vincent M. Pompo, from PADEP Assistant Counsel Alexandra C. Kauper, the PADEP determined that wetland area(s) on the Tri-County Mall site that support bog turtle habitat are considered Exceptional Value wetlands, as defined at 25 Pa. Code §105.17(1). 25 Pa. Code §105.14(b) also sets forth stringent requirements for PADEP review regarding primary and secondary effects of permit applications which propose water obstructions and/or encroachments, as the applicant proposes. The requirements regarding permits in Exceptional Value wetlands, which are set forth at 25 Pa. Code §105.18(a), define the specific requirements for projects affecting such wetlands.

In the Final Addendum to the Biological Assessment (dated November 22, 2000; see p. 3) the applicant's consultant states that "[t]he *Piccone project as proposed will cause adverse impacts on an exceptional value wetland (EV) of about 3 acres in area, including a headwater stream, headwater floodplain wetlands, and slope wetlands.*" According to 25 Pa. Code §105.18(a), unless the applicant affirmatively demonstrates and the PADEP finds in writing that a project is necessary to abate a substantial threat to the public health and safety, PADEP will not grant a permit under Chapter 105 for a dam, water obstruction or encroachment located in, along or projecting into an Exceptional Value wetland, or otherwise affecting an Exceptional Value wetland, unless the applicant affirmatively demonstrates and the PADEP issues a written finding that certain requirements are met. These requirements include, but are not limited to: 1) the encroachment will not have an adverse impact on the wetland; 2) the project will not cause or contribute to a violation of an applicable State water quality standard; 3) the project will not cause or contribute to pollution of groundwater or surface water resources or diminution of resources sufficient to interfere with their uses; and 4) the cumulative effect of this project and other projects will not result in the impairment of the Commonwealth's exceptional value wetland resources.

In addition, a Pennsylvania Department of Transportation (PennDOT) Highway Occupancy Permit (HOP) is required for low, medium and high volume driveways pursuant to section 420 of the act of June 1, 1945 (PL 1242, No. 428). According to Service's administrative record, a HOP (#651193) was issued by PennDOT District 5-0 to the applicant for the Tri-County Mall. According to the permit, "all work under this permit may be started on July 22, 1992, and shall be completed on or before July 22, 1993." Because all work was not completed by the required date, the permit was revoked by District 5-0 on August 25, 1999. The issuance of an HOP for the proposed project is subject to all conditions, restrictions, and regulations prescribed by PennDOT, (e.g., see 67 Pa. Code, Chapters 203, 441 and 459) and subject to the plans, special conditions, or restrictions attached to the permit. Prior to issuance of another HOP for this project, the permit shall be recorded in the Berks County Recorder of Deeds. It is also our understanding that an additional traffic study may be required for a new HOP due to the time that has elapsed since the first permit was issued (i.e., 1992).

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

As defined in 50 CFR 402.02, “action” means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States. The “action area” is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. The direct and indirect effects of the actions and activities must be considered in conjunction with the effects of other past and present federal, State, or private activities within the action area.

For the purposes of this biological opinion, the action area includes the 38.04-acre parcel on which the Tri-County Mall is proposed to be built, along with the right-of-way associated with State Route 10 immediately adjacent to this parcel. The site is located in Caernarvon Township, southern Berks County, Pennsylvania, and has been owned by Joseph A. Piccone, Inc., since 1988. The property is bounded on the south by the Pennsylvania Turnpike (I-76), and on the east by a swimming club and the Pennsylvania Turnpike Authority at the I-176 Interchange (Figure 1). The western and northern boundaries adjoin State Route 10 (Morgantown Road). The bog turtle has been found within a large (3.139 acres), spring-fed wetland system located along an unnamed tributary to the Conestoga River (= “Farm Tributary”) in the central portion of the property. The BA refers to the six-acre area of the site north of the Farm Tributary and south of Route 10 as the “north side,” and the 28.9-acre area south of the Farm Tributary and north of the Pennsylvania Turnpike as the “south side” of the property. The action area also includes approximately 800 feet (19,771 sq. ft. or 0.45 acre) within the right-of-way limits of Route 10 (located adjacent to the property boundary on the north and west) subject to widening for a separate left turn lane, which is required for the signalized access driveway to the site.

Although approximately 90 percent of the project area is undeveloped, the entire site is currently zoned for commercial development (C-3, Highway Commercial). At present, a former Pennsylvania Turnpike interchange (abandoned in 1995), a paved parking lot, and farm buildings occupy about ten percent of the existing site. Approximately 60 percent of the property is in cropland, ten percent is in herbaceous or shrub rangeland, and ten percent is in early successional forest cover. Less than ten percent (3.576 acres) of the remaining open space is wetlands.

The proposed action involves construction of a commercial retail shopping center, and widening of Route 10 adjacent to, but on the opposite side of, the 38-acre tract. According to Plan Number E99076-MP1 (last revised on May 24, 2000), a total of 254,350 square feet of commercial space is proposed. Two restaurants (14,400 sq. ft.), a gas station (3,500 sq. ft.), two access roads, and associated parking areas and utilities are proposed to be constructed on the six-acre portion of the project area to the north of the Farm Tributary and wetland. Ten buildings (236,450 sq. ft.), associated parking areas and utilities, and a stormwater detention basin and outfall area are proposed to be constructed on the 28.9-acre portion of the project area south of the Farm Tributary and main wetland

area. An existing farm road crossing will be used to move fill from the south side of the project area to the north side.

The proposed action requires a Department of the Army permit to authorize the discharge of fill material within 100 linear feet of the Farm Tributary, 450 linear feet of a headwater stream channel located in the southeast quadrant of the project area, and 0.68 acre of jurisdictional wetlands for two culvert crossings, utility crossings, parking areas, the footprints of a bank and building H, and portions of a stormwater management facility (Figure 2). The BA and Figure 2 assume that no upland buffers will be conserved around the wetlands (i.e., development will occur up to the edge of the delineated wetlands).

Two wetland and stream culvert crossings are proposed for access from the north side to the south side of the site. Two box culverts (up to 28 feet in width) or squash pipes, plus fill, will affect approximately 3,000 square feet of the stream channel and wetland at the upper (western) end of the Farm Tributary near the confluence of the three channels. Construction activities for the lower (eastern) road crossing (two box culverts up to 28 feet in width or squash pipes, plus additional fill) located at or just downstream of the current farm road crossing, will eliminate 7,500 square feet of stream channel and wetland. Existing water and sewer lines that terminate at the southeastern edge of the project area will require a crossing of the Farm Tributary to service any facilities constructed on the north side. Project construction will also require blasting into bedrock on the south side of the project area.

The new mall will be operated and maintained year-round. Salt and skid-resistant materials will be spread on access roads and parking lots during winter months and bad weather conditions. The proposed project will use a gravity drainage system to collect the stormwater runoff generated by the development north and south of the wetlands. The stormwater will be conveyed via a collection system using a piping network with a general alignment running northwest to southeast to eventually be discharged into a main detention basin in the southeast corner of the site. The proposed piping network serving the intervening parking areas on the north side and the south side would also be tied into the main detention basin. The stormwater held in the main detention basin will be released into an existing drainage channel that flows over riprap into a Turnpike Commission detention basin located immediately east of the property line. The Turnpike basin discharges at a location downstream of the main Farm Tributary wetland.

According to the final addendum to the BA (dated November 22, 2000; see p. 3), and the consultant for the applicant (Robert P. Brooks, pers. comm.; February 27, 2001), the best available technology will be implemented to maintain groundwater flow and hydrology on the north side of the wetlands. These facilities will be constructed to collect, treat (filter), and reinject roof water runoff at appropriate times in quantities that will maintain baseline hydrologic inputs (e.g., comparable to pre-project conditions).

Wetland mitigation is proposed to replace direct wetland losses (0.68 acre) due to project construction with comparable wetland types and areas at a site with a high probability of long-term viability (Addendum to BA, p. 4)

Conservation Measures

In association with this project, the applicant proposes to implement several conservation measures. These measures are detailed in the “monitoring and mitigation” section of the BA (pp. 43-44), and as “immediate mitigation measures” in the November 22, 2000, final addendum to the BA (pp. 3-4). A summary of the most significant of these conservation measures follows.

1. Commitments related to bog turtle:
 - a. Conduct preconstruction bog turtle surveys to remove turtles occupying wetland portions of construction impact areas. Install sturdy barriers to prevent bog turtles from dispersing into the construction impact areas, rather than installing the usual silt fencing material (BA, pp. 37, 43).
 - b. Complete an exhaustive bog turtle mark and recapture study to assess population size and age structure within the action area (BA, p. 43).
 - c. Implement an intensive program monitoring on-site bog turtles and their habitat during a ten-year post-construction period (BA, pp. 37, 43).
 - d. A minimum of one wetland known to be occupied bog turtle habitat (minimum six acres) and additional adequate upland buffer (minimum 300 feet) will be donated to, and managed by, the Berks County Conservancy. This will be accomplished via fee-simple title transfer or acceptance by the Conservancy of a perpetual right-of-way and easement (i.e., permanent conservation easement; BA addendum, p. 4). This transaction will be completed within three years of the date of the final biological opinion and will be funded using a \$150,000 donation from the applicant (February 20, 2001, letter from J. Hoffman to M. Templin).
 - e. Manage woody vegetation to maintain open areas of the wetland (BA, p. 35)
 - f. Minimize the number of open refuse containers near the Farm Tributary and wetlands to limit the numbers of subsidized predators of bog turtles and bog turtle eggs due to project operation (BA, pp. 42-43).
 - g. The applicant will contribute \$50,000 for on-site bog turtle conservation and monitoring measures.

2. Construction-related commitments:

- a. Install natural-bottom box culverts through the main wetland for the two road crossings (BA addendum, p. 2).
- b. Move the eastern road crossing further out of the core bog turtle habitat into an area located downstream of the existing abandoned farm road crossing (BA addendum, p. 3). Leave the existing farm road crossing in place to minimize direct wetland impacts immediately upstream (BA, p. 36).
- c. Implement the best available technology for restoring groundwater recharge using high quality stormwater collected on the north side of the site (BA final addendum, dated November 22, 2000, p. 2).
- d. Construct vertical curbing (minimum 10 inches in height) along the entire wetland/upland boundary to prevent stormwater from flowing off paved areas into the main wetland, and to prevent bog turtles from accessing the proposed roads, parking areas, and gas station (BA, p. 39).
- e. Stormwater flows generated from all parking areas and access roads will be collected in a catch basin located at the eastern portion of the project area, north of the Farm Tributary, and directed away from the main wetland to a piping network that discharges to the proposed main detention basin in the southeast corner of the property. The stormwater held in that basin will be discharged at a location downstream of the occupied bog turtle habitat into the existing drainage channel that flows over riprap into the Turnpike Commission detention basin immediately east of the action area (BA, pp. 39, 40, 42).
- f. Design and implement the stormwater collection system on the north side to prevent entry by bog turtles (BA, p. 39).
- g. Design all storm sewer grates with openings small enough to prevent bog turtle entry (BA, p. 39).

STATUS OF THE SPECIES

Species Description

The bog turtle is the smallest member of the genus *Clemmys*, with the upper shell of adults measuring 7.5 to 11.4 centimeters. The weakly-keeled, domed carapace varies in color from light brown to

ebony. The scutes of the shell often have lighter-colored centers resembling a star-burst pattern. The lower shell is brownish-black with contrasting yellow or cream areas, often along the mid-line. The large, conspicuous bright orange, yellow, or red blotch on each side of the head is a distinguishing characteristic of the species. A more detailed description can be found in the final rule listing the species as threatened (62 FR 59606) or in Bury (1979).

Life History

Bog turtles are semi-aquatic and only active from April to mid-October in the northern part of their range (Barton and Price 1955, Arndt 1977, Nemuras 1967). Bog turtles hibernate from October to April, often just below the upper surface of frozen mud or ice (Chase *et al.* 1989). Their varied diet consists of beetles, lepidopteran larvae, caddisfly larvae, snails, nematodes, millipedes, fleshy pondweed seeds, sedge seeds, and carrion (Barton and Price 1955, Nemuras 1967). Bog turtle densities range from 7 to 213 per hectare (Chase *et al.* 1989). They usually occur in discrete populations occupying suitable habitat dispersed along a watershed (Collins 1990).

Bog turtles typically inhabit shallow spring-fed fens, sphagnum bogs, swamps, marshy meadows, and pastures with soft muddy areas. These emergent wetlands are usually a mosaic of shallow water, soft muddy bottoms, low grasses and sedges, and interspersed wet and dry pockets. Spring-seeps often form a network of small rivulets in the wetland. The open canopy of these wetlands provides sunlight for basking and nesting, and is essential for continued use by bog turtles. The shallow water and mucky soils allow bog turtles to disappear from sight within seconds after being disturbed or sensing an approaching threat. Deep, mucky, organic soils are a crucial bog turtle habitat component. Burrowing under the muck is the species' primary anti-predator defense mechanism.

Bog turtle habitats are sustained primarily by groundwater, although surface water also contributes to wetland maintenance. Bog turtles depend upon relatively stable, year-round supplies of clean groundwater to support their food base, brumation (hibernation) and estivation areas, and their nesting habitat. Soft substrates and slow moving water both above and below the surface protect the bog turtles against freezing and overheating. Ernst *et al.* (1989) reported on bog turtle hibernation sites in New Jersey and Pennsylvania. They found turtles hibernating in spring-fed rivulets under soft mud, in muskrat burrows, under sedge clumps, at the base of tree stumps, and in meadow vole burrows. Morrow reported finding 17 bog turtles and one spotted turtle in a communal hibernaculum in Harford County, Maryland (S. Smith *in litt.* 2000).

Female bog turtles reach sexual maturity between 5 and 8 years of age (Barton and Price 1955, Ernst 1977). Mating occurs in May and June, and females deposit from two to six white eggs in sphagnum moss or sedge tussocks in May, June, or July (Arndt 1977, Herman 1990, Herman and George 1986, Klemens *in press*). The eggs hatch after an incubation period of 42 to 56 days (Arndt 1977, Herman 1990), and the young emerge in August or early September (Arndt 1977, Barton and Price 1955).

Infertile eggs are common (Arndt 1977, Herman 1990, Tryon 1990), and not all females produce clutches annually (Tryon 1990). There is no evidence to suggest that multiple clutches are deposited in a single season.

Bog turtles (particularly the eggs and young) are preyed upon by raccoons, opossums, skunks, foxes, snapping turtles, water snakes, and large birds (Herman and George 1986). Many of the primary predators on bog turtles and their nests are human commensals--i.e., they flourish in areas with high human density and fragmented landscapes. In some cases, predation contributes to population declines by impairing reproductive recruitment so that the population age structure is skewed toward older individuals (Zappalorti and Rocco 1993). Zappalorti (*in litt.* 1997) reported that one of his Pennsylvania study sites has undergone a dramatic population decline in the past 25 years due to predation on bog turtle eggs and young.

Wetlands undergoing succession, or invasion by exotic species such as multiflora rose (*Rosa multiflora*), purple loosestrife (*Lythrum salicaria*), giant reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*) and/or red maple (*Acer rubrum*), decline in habitat quality and may be abandoned by the turtles. Soil disturbance and roads often provide avenues for the introduction or spread of invasive native and exotic plants.

Bog turtles are known to use streams as travel corridors and avenues for dispersal into new unoccupied wetlands (Klemens 1989). Movement of bog turtles between wetlands usually occurs along interconnecting water courses, but turtles have also been observed traveling overland through cornfields and pine plantations, across roads (especially those adjacent to or within wetlands), and through other terrestrial habitats (Carter *et al.* 2000). According to the BA (p. 29), a Berks County resident reported finding a bog turtle on the side of the road, moving uphill along a power line right-of-way that cuts through a moderately steep ridge. In addition to numerous records of live bog turtles observed crossing roads in Pennsylvania, evidence of attempted dispersal of this species between wetlands includes numerous records of bog turtles found dead-on-the-road (DOR). One example includes a DOR bog turtle located approximately 1 km from a known colony in Chester County, Pennsylvania (BA, p. 29). In New Jersey, several crushed bog turtles had climbed a steep roadway embankment adjacent to an occupied site to reach the road (R. Arndt, Stockton College, pers. comm.; February 27, 2001).

A comprehensive description of bog turtle life history can be found under "Background" in the final rule for listing (62 FR 59605).

Status of the Species Within its Range

The northern population of the bog turtle was federally listed as threatened, and the southern population listed as threatened due to similarity of appearance, on November 4, 1997 (62 FR 59615). A agency

draft of the recovery plan for the species was released for public comment in September 2000 and will be finalized in 2001.

The species has been reported from twelve eastern States, with a sparse, discontinuous and localized distribution over a geographic range extending from western Massachusetts and Connecticut, southward through southern New York south to New Jersey and eastern Pennsylvania, to northern Delaware and Maryland, and then southward in the Appalachian Mountains from southwestern Virginia, North Carolina, Tennessee and South Carolina to northern Georgia (USFWS 2000, p. 2). A 250-mile gap within the range separates the species into distinct (i.e., allopatric) northern and southern populations (Klemens in press, Tryon 1990, Tryon and Herman 1990). Disjunct populations previously occurred in western Pennsylvania, and in the Lake George and Finger Lakes regions of New York. The western Pennsylvania and Lake George populations have been extirpated, and only a remnant population exists at one remaining site in the Finger Lakes region (62 FR 59606).

Based upon documented losses of bog turtles and their habitat, the northern population has declined by at least 50 percent, with most of the decline occurring over the past 20 years. As of 2000, there were 360 known extant bog turtle sites (referred to as population analysis sites, or PAS's) within the range of the northern population. Due to widespread wetland habitat fragmentation throughout the bog turtle's range, however, many sites consist of only one small, marginally viable, extant occurrence, often isolated from other such occurrences and under threat of development (USFWS 2000, p. 5).

Habitat loss (i.e., via destruction, degradation, and fragmentation) and illegal collecting for the pet trade are the primary threats to the species. Direct habitat loss or degradation has occurred from the draining, ditching, dredging, or filling of suitable sites for agricultural use, development, and pond or reservoir construction. The proximity of many remaining bog turtles to roadways and population centers exposes these populations to increased predation, road kills, pollution, and establishment of invasive native or exotic plant species which pose a significant indirect threat to the species. The eggs and young bog turtles are particularly vulnerable to predators such as raccoon, opossum, skunk, fox, snapping turtle, water snake, and larger birds. Populations of many of these predators are elevated in areas of high human activity.

The bog turtle is also vulnerable to local extirpation and range-wide reduction due to the small size and isolation of many populations, delayed sexual maturity, low juvenile recruitment, low mobility, and small home range (Arndt 1977, Chase *et al.* 1989). Isolation of populations prevents gene flow which can result in an inbred population with low fecundity. Furthermore, isolation and habitat fragmentation prevent the recolonization of existing habitat where populations have declined or disappeared, as well as expansion and colonization of newly created habitat (62 FR 59620).

Recovery Units

At publication, a species' recovery plan lays out the best available scientific information relative to the areas and environmental elements needed for that species to recover. Recovery plans may geographically describe actual recovery units (e.g., show lines on a map) essential to recovering the species that may or may not have been designated as critical habitat.

As proposed in the Agency Draft of the bog turtle recovery plan, the overall recovery objective is to secure long-term protection, restoration and maintenance for no fewer than 185 populations (PAS populations) and habitat in the northern allopatric range of this species. To facilitate recovery, the northern allopatric population of the bog turtle is divided into five recovery units: Prairie Peninsula/Lake Plain, Outer Coastal Plain, Hudson/Housatonic, Susquehanna/Potomac, and Delaware. These five recovery units are distinguished from one another by a combination of the following characteristics: habitat distinctiveness, biogeographical and ecological affinities, and variation in the intensity and severity of multiple threats to the species' survival (USFWS 2000, p. 30).

The bog turtle population in the action area is located within the Susquehanna/Potomac Recovery Unit, whose land use is characterized by active agriculture including both grazing and crop farming. The agricultural influence is both historic and current, though agricultural abandonment is resulting in habitat change through succession, development, and invasive species. Although this recovery unit has the highest densities of bog turtle sightings (102), almost all sites are disturbed. Major threats within this recovery unit include conversion of wetlands to farm ponds, non-point source pollution, lack of buffers around wetlands, and hydrological impacts from residential development. The invasive plant community is different from the more northerly sites, with multiflora rose and reed canary grass the dominant invaders. This contrasts with northern populations where purple loosestrife and giant reed are the dominant invasive species (USFWS 2000, p. 30).

The recovery objective for the Susquehanna/Potomac Recovery Unit is to protect 50 viable bog turtle populations and sufficient habitat to ensure the sustainability of these populations. This recovery unit is divided into the following subunits: 1) Potomac (consisting of the Potomac River watershed; 2) Susquehanna West (consisting of the Susquehanna watershed west of the Susquehanna River; and 3) Susquehanna East (consisting of the Susquehanna watershed east of the Susquehanna River, including sites draining directly to the Chesapeake Bay) (USFWS 2000, p. 42). There are currently five, 69, and 28 extant bog turtle sites in the Potomac, Susquehanna West, and Susquehanna East subunits, respectively. To meet the recovery criteria for this recovery unit, at least three populations must be permanently protected in the Potomac subunit, at least 30 in the Susquehanna West subunit, and at least 10 in the Susquehanna East subunit (USFWS 2000, p. 43). To date, there are very few sites (< 10) in the Susquehanna/Potomac Recovery Unit located on public or private lands that have long-term protection.

Additional information on the recovery objectives, status, and threats to the bog turtle can be found under "Summary of Factors Affecting the Species" in the final rule for listing (62 FR 59615) and

“Reasons for Decline and Threats to Continued Existence” in the Agency Draft Recovery Plan for the Northern Population of the Bog Turtle (USFWS 2000).

Status of the Bog Turtle in Pennsylvania

Bog turtles are still found in 14 of the 17 counties from which the species was historically recorded in Pennsylvania. Because a disjunct population of the species was extirpated from the northwestern counties Pennsylvania, bog turtles are presently known to occur only in counties of the Commonwealth's southeastern corner. Land use in southeastern Pennsylvania is primarily urban (several large cities, including Philadelphia, Harrisburg, Reading, Lancaster, and York are located there), residential, and agricultural. The proximity of many remaining bog turtle populations to rapidly developing areas poses a significant threat to the species. Due to prevalent habitat fragmentation, many remaining extant sites in Pennsylvania are small, isolated, and support few bog turtles; these sites are at great risk from collection, agricultural pollution, and vegetative succession (Torocco *in litt.* 1997).

Approximately 84 percent of bog turtle habitat in Pennsylvania is found on private lands, with the remainder in State or federal ownership (Barton *in litt.* 1994). Although there are 77 known bog turtle sites in Pennsylvania, only seven bog turtle sites (distributed across the Susquehanna/ Potomac and Delaware units) are currently protected from present and foreseeable anthropogenic and natural threats that may interfere with their survival. These sites are protected by measures that include conservation of wetlands and upland buffers (e.g., via acquisition or conservation easements), cooperative management agreements, and other measures that protect at least a portion of the watersheds inhabited by this species.

ENVIRONMENTAL BASELINE

Status of Species Within the Action Area.

Within the action area, the primary habitat of concern is a stream and wetland complex that bisects the property. As discussed above, this unnamed tributary to the Conestoga River and its associated 3.139-acre, spring-fed wetland is referred to as the “Farm Tributary” in the BA. There is an existing farm road crossing located in the center of the site, and oriented north-south (Figure 1). Below this crossing are two slope wetlands that flow into, and are directly connected to the main stream-wetland complex (BA, p. 3).

The project site was visited by Gian L. Rocco on June 8 and 17, 2000. Weather conditions were conducive to reptile surface activity on both days. One adult female bog turtle (carapace length 103.2 mm; 8-9 annuli) was found in the main wetland on June 17, 2000, within one hour of arrival. Because the purpose of the survey was to determine the presence or absence of bog turtles, less than one-half hour was spent searching other on-site wetland areas following the capture of the bog turtle. On the same day, one adult snapping turtle (*Chelydra serpentina*) was observed nesting in the field north of

the wetland. Pickerel frogs (*Rana palustris*) and green frogs (*Rana c. melanota*) are common on the site. One redback salamander (*Plethodon cinereus*) was found in the forested area (Rocco 2000).

Because only a presence/absence survey was conducted, insufficient information was obtained to determine bog turtle population size, structure, recruitment and viability. An intensive mark-recapture study would be required to obtain that level of information. However, it does appear that the subject population is relatively isolated from other bog turtle populations and from potentially suitable habitat outside the action area. Based on information about bog turtle population biology, home ranges, dispersal patterns, the apparent lack of suitable dispersal routes to and from the action area, and the location of the nearest wetlands outside the action area, the BA (p. 34, 35) concludes that 1) it is unlikely that bog turtles will be able to disperse into the action area from neighboring bog turtle sites, and 2) the consequent isolation of this population appreciably reduces its long-term viability. The BA (p. 35) notes, however, that if the main wetland within the action area supports a population of comparable size and recruitment potential as that found in some of the better bog turtle sites within Pennsylvania, then the on-site bog turtle population “could probably persist for many, many decades.”

According to the BA (pp. 25, 26), wetland portions of the action area, particularly the main wetland and two adjoining slope wetlands, compare favorably with typical bog turtle habitat elsewhere in southeastern Pennsylvania. The forested wetland floodplain, while not necessarily suitable breeding habitat, it is an important habitat component, serving as an undisturbed dispersal corridor for bog turtles to move to downstream areas. This complex of wetlands is certainly capable of sustaining a small bog turtle population year-round since needs for overwintering, feeding, thermoregulation, and nesting can be met on the site.

In addition, there are four smaller wetlands located on the south side of the property, outside of the main, headwater, spring-fed slope wetland and stream corridor. Three isolated wetlands located south and west of the Farm Tributary, numbered 1 (0.122 acre), 2 (0.096 acre), and 3 (0.116 acre) (Figure 1), receive stormwater runoff from Route 10 and are maintained primarily by the perching of surface water. All three are primarily vegetated by low grasses and sedges, and may be used seasonally or be part of the home range of some individual bog turtles, given their proximity to the suitable wetland habitat (BA, p. 23).

Wetland 4 (0.103 acre) is located in the southeastern portion of the site along the stormwater channel east of the abandoned turnpike interchange loop. Wetland 4 is situated the greatest distance from the main stream corridor/wetland complex. A drainage channel on either side of Wetland 4 is supplied primarily by stormwater flows from the Pennsylvania Turnpike and abandoned interchange. Currently, these waters flow into the retention basin near the tollbooth. Because very dense cattail growth dominates this wetland (except along its border where a few clumps of tussock-forming grasses occur), this wetland does not contain the tussock-forming vegetation, soft, mucky soils or year-round hydrology typical of bog turtle habitat. Therefore, the construction as proposed within this wetland is not likely to adversely affect bog turtles or their habitat.

The Service concurs with BA conclusions (p. 23) that the wetland plant community is fairly diverse and of a moderate to low quality, and that the project site is similar to disturbed to severely disturbed wetlands as measured by the Floristic Quality Assessment Index. Much of the main wetland bordering the Farm Tributary is vegetated by rice cut grass (*Leersia oryzoides*) and jewelweed (*Impatiens capensis*). Cattail (*Typha latifolia*) and a variety of grasses and sedges vegetate the area nearest and west of the farm road crossing. Shrubs, primarily multiflora rose, border about 50 percent of the wetland. Common reed (*Phragmites communis*) grows in the upper end of the northeast tributary, alongside Route 10. The largest slope wetland, situated east of the farm road crossing and north of the stream corridor, is densely vegetated by skunk cabbage (*Symplocarpus foetidus*) and cattail. Grasses, sedges, and soft rush (*Juncus effusus*) are also present along the border. Grasses, sedges, and jewelweed are the dominant species in the second slope wetland; dense shrub growth borders much of its southern end. This wetland is found east of the other slope wetland and is associated with a small, spring-fed depression that drains to the main stream. A shaded, deciduous forested flood plain forms the wetland type for the remaining portion on the site; it is particularly wet on the north bank. Jewelweed and skunk cabbage are the most ubiquitous ground plants.

Factors Affecting the Species' Environment (Within the Action Area)

The BA (pp. 8-12) documents a gradual reduction in emergent wetland habitat and natural stream meanders in the Farm Tributary over the past 200 years, especially with respect to the area located immediately downstream of the project site. The stream and wetland appear to have been surrounded by agricultural activities since 1783. Few woody plants appeared in the stream corridor along its length to its eastern confluence with the Conestoga River until the late 1980s, when the riparian corridor downstream (east) of the farm road crossing became reforested. By being maintained in an early successional stage, these areas were probably suitable bog turtle habitat, and may have consistently supported bog turtles, for over 200 years.

Over the historic period examined in the BA (p. 12), there has been a trend toward increased development, including transportation, commercial development, and residential projects across the surrounding landscape within about two miles of the action area. Road-building activities in the late 1940s to 1950 caused adverse impacts to the wetland and stream by re-routing surface water flows on the south, west, and north boundaries of the action area, and restricting access by bog turtles and other wildlife over road embankments. Impacts from road building increased with the construction of I-176 in the late 1980s, and the abandonment, but not removal, of the original Morgantown Interchange in 1995. Construction initiated in 1993 that was associated with the new Turnpike Interchange significantly altered the stream channel and filled associated wetlands downstream of the eastern boundary of the site, causing further isolation and fragmentation of bog turtle habitat.

The BA (pp. 12-22) provides a description of the hydrologic conditions within the action area, including discussions of the sources of surface water and groundwater supplying the Farm Tributary and

the main wetland. It appears that the wetland and tributary are predominantly groundwater-fed, and that geology and surrounding land use patterns have influenced recharge patterns.

From the hydrologic analyses conducted by applicant's consultants, and their interpretation of local hydrogeology, the BA concludes that the Farm Tributary and its wetlands receive significant amounts of groundwater both from the 6.0 acres on the north side, and from a larger recharge zone north of Route 10 (BA, p. 21). Flume measurements, water temperature and conductivity readings were taken at the site in September 2000. Field observations of the underlying geology, soil characteristics, and presence of seeps were also noted. In addition to these observations, previous reports written by consultants addressing subsurface conditions at the site, and published information concerning the geology and hydrogeology of the region and action area were examined. Based on this information, the BA concludes that groundwater discharge from the relatively shallow Stockton formation or at the soil/bedrock interface north of the Farm Tributary and north of Route 10 contributes the largest percentage of flow to the occupied bog turtle habitat. Analyses of infiltration and discharge rates indicate that the north side (i.e., the 6 acres north of the Farm Tributary) currently contributes approximately 3.6 million gallons per year to infiltration. Measurements also indicate that at least 7.7 additional acres of groundwater recharge area are located off-site to the north and west of Route 10 and contribute flow (under the road ballast material) to the bog turtle habitat. Based on field observations by the applicant's consultants, and the bedrock geology of the site, it is assumed that most groundwater on the south side of the Farm tributary does not discharge to this tributary (BA, pp. 21-22).

Surface water contributions to the bog turtle habitat come from both the north and south sides of the action area. Based on an analysis of pre-development stormwater quantity contributing to the main wetland from a two-acre strip of primarily of mown fields located on the south side, approximately 393,000 gallons of surface water drains annually from a topographic high that is located about 100 feet south of the main wetland. On the north side, surface runoff is contributed from six acres of brush and fallow fields. In addition, site development plans identify three culverts under Route 10 that supply surface water to the wetland. According to maps prepared by Vitello Corporation as part of the Stormwater Narrative for the Tri-County Mall (dated December 1999), the area drained by these culverts is approximately 200 acres. The westernmost culvert (36-inch diameter) drains some portion of the land west of Mineview Road. Some sediment and cattails have accumulated at the outfall, suggesting a strong surface water influence. The center culvert (15-inch diameter) drains the southern portion of the triangle between Mineview Road and Route 10. The easternmost culvert (15-inch diameter) drains the northern portion of the triangle between Mineview Road and Route 10. Common reed has invaded the outfall area of the culvert, suggesting a surface water influence. Discharges from these pipes create three distinct rivulets. A short distance downstream, these converge to form the wider flood plain of the Farm Tributary. The surface water contributions from the three culverts to the Farm Tributary wetlands appear to be minimal, based on observed flows and lack of scouring observed at the outfalls (BA, p. 18).

Pollutant loadings in the stormwater runoff currently entering the main wetlands is minimal, given the relatively undisturbed nature of the existing site, existing riparian buffer, and minimal contribution of site runoff to the Farm Tributary (BA, p. 22).

The BA (pp. 12, 25, 34, 35) concludes that changes to the surrounding landscape have been detrimental to the site's wetlands. Wetland fragmentation and isolation by roads surrounding the site prevent bog turtle immigration and reduce the long-term viability of this bog turtle population. Within the action area, an existing farm road crossing (Figure 1) bisects the main wetland. However, this narrow (less than 10 feet wide) crossing is not considered to be an impediment to bog turtle movement or dispersal within the wetland.

With the cessation of grazing on the site, succession will accelerate. In addition, further development outside the boundaries of the action area, particularly along the western and northern boundaries, would cause further habitat degradation by introducing additional stormwater through the three culverts under Route 10, eroding the mucky wetland substrates, and further incising the stream channel.

EFFECTS OF THE ACTION

At 50 CFR 402.02, the "effects of the action" are defined as including the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with this action, that will be added to the environmental baseline. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur. The proposed shopping mall will have both direct and indirect effects on the bog turtle within the action area.

Construction-related Effects

Bog Turtle Death and Injury

We concur with the BA's conclusion that *"(I)t is likely that some direct loss of bog turtles would occur during construction either through excavation of hibernation areas during the winter, or disturbance of resting or nesting habitats during other times of the year"* (Executive Summary, p. xi).

We expect that all bog turtles not relocated outside of wetland construction areas will be killed due to suffocation and/or crushing under the weight of culverts and/or fill material. Because no timing restriction is proposed for construction activities, turtles that are in wetland construction areas may be missed during pre-construction searches, especially if the searches are conducted when wetland vegetation is thick or the turtles are brumating. Due to the lack of comprehensive tracking surveys, the location of bog turtle overwintering areas is unknown. Therefore, if construction of the two road crossings occurs when turtles are brumating (between approximately November 15 and April 15),

individual bog turtles or an entire group of overwintering bog turtles in a communal hibernaculum could be excavated and/or crushed by heavy machinery. In addition, physical disturbances such as vibration and blasting into bedrock on the southern side (BA, p. 39) could fracture bedrock, affecting groundwater flow. If groundwater is directed away from the hibernation area(s), the death of brumating bog turtles would be expected due to freezing, asphyxiation or desiccation.

The Service, State wildlife agencies, and bog turtle researchers recognize the difficulties associated with conducting bog turtle surveys; even under the best conditions, bog turtles can be difficult to locate (62 FR 59611). Due to the small size of the turtles (especially hatchlings and juveniles), and their tendency to bury themselves deep within the muck when disturbed, we anticipate that some bog turtles within the wetland construction zones will be missed during pre-construction surveys, and will therefore perish. Turtles that are relocated to a different portion of the wetland will be at greater risk of mortality due to displacement from or partial loss of their home range and its essential foraging, basking and sheltering areas.

If the fencing erected around any of the wetland or upland construction zones is not properly maintained to keep bog turtles from entering those areas, bog turtles will likely be killed or injured by machinery or fill material. There is also the potential for turtles to become trapped within construction areas and die from starvation, dehydration or heat-exposure.

Bog turtles could also be killed or injured as a result of the discharge of petroleum products or other hazardous substances into the wetland during construction. Likewise, bog turtles could be killed by smothering as a result of the discharge of large amounts of sediment during construction.

Habitat Destruction and Fragmentation

Although Wetlands 1, 2, and 3 (totaling 0.33 acre) provide lower quality habitat due to their seasonal hydrology, given their proximity to the main wetland they are likely to be used by bog turtles for foraging, resting, and basking. All of these small wetlands will be permanently lost due to the proposed construction of a bank and associated parking areas.

In addition to the destruction (via filling) of the above wetlands, two wetland/stream crossings are proposed through the main wetland. The upper (western) road crossing will eliminate 3,000 square feet (0.07 acre) of bog turtle habitat, while the lower (eastern) road crossing will eliminate 7,500 square feet (0.17 acre) of bog turtle habitat. In addition, utility crossings will be installed alongside the eastern crossing and will require temporary wetland excavation and disturbance. Thus, a total of 0.24 acre of occupied bog turtle habitat will be permanently lost by construction of the two road crossings and associated utilities through the main wetland.

The loss (via filling) and fragmentation (via road crossings) of the bog turtle's wetland habitat is likely to interfere with the turtle's breeding, feeding and sheltering behaviors to such an extent that harm and

harassment occur. The wetland/stream crossings will undoubtedly destroy and fragment areas currently used by bog turtles for basking, nesting, foraging, estivation and/or brumation. In addition, harassment is likely due to the noise, vibration and presence of construction activities in and adjacent to bog turtle habitat. Some bog turtles may respond to construction activities by attempting to disperse from the action area, which will place them at additional risk of mortality (see “Increased Risk of Road- and Parking Lot-related Mortality” under “Anticipated Effects Due to Project Operation and Maintenance”).

Anticipated Effects to Habitat Quality (Long-term Habitat Degradation)

Changes in Wetland Hydrology

Even when located in upland areas, development can cause hydrological alterations of adjacent wetland habitats. If development presents a barrier to surface water or groundwater flow, the wetland can become wetter or drier, either of which may render the habitat less suitable or unsuitable for bog turtles. If surface water is intercepted, groundwater recharge may be reduced, potentially reducing water levels in adjacent wetlands (62FR 59615).

Studies by the applicant’s consultant have confirmed our determination that the proposed project will directly and indirectly affect both surface and groundwater flows to this wetland. Construction activity is likely to increase water temperatures and sedimentation, and affect wetland recharge, leading to the destruction or degradation of wetland vegetation used by bog turtles.

Land development activities on the north side (i.e., filling for the construction of two access roads, two restaurants, parking areas, and a fueling station with two underground storage tanks) will cause significant reductions in the supply of groundwater to the main wetland and Farm Tributary (BA, p. x). This is due primarily to filling and the creation of impervious surfaces (e.g., pavement, sidewalks) on 4.1 acres (approximately two-thirds) of the north side. Without implementing the best available technology to infiltrate surface runoff into the groundwater, a comparison of pre- and post-development conditions indicates stormwater ending up as runoff from the north side increases by about 3.5 million gallons (BA, p. 40). This corresponds with a decrease in the amount of precipitation that ends up as either groundwater recharge or evapotranspiration.

The applicant has agreed to implement the best available technology for recharging groundwater by infiltrating roof waters collected on the north side (BA final addendum, dated November 22, 2000; p. 3). The Service concurs with the applicant’s conclusion that collected roof runoff is preferable for mitigation versus parking lot runoff for water quality reasons (Comments by R. Wardrop on Recharge Options for Tri-County Mall Project, north 6-acre area; October 27, 2000). In addition, Mr. Wardrop stated that control of water temperature may be a critical element of such an approach. We also concur with the conclusion in the final addendum to the BA that “it is very hard, if not impossible, to assure natural original groundwater recharge rates post development.” Finally, Mr. Wardrop also

states “in almost every case, the duration of peak runoff periods is considerably greater under the post-construction versus pre-construction conditions.” Therefore, based on a review of the information provided to the Service, we concur with the conclusion in the BA (p. 41) that a shift in the hydrologic regime in favor of surface water is likely to occur, with a corresponding change in vegetation.

Therefore, the hydroperiod of the wetland is expected to become flashier, which would degrade the habitat conditions favored by bog turtles.

A two-acre strip of upland adjacent to and south of the main wetland currently provides surface and groundwater hydrology to the main wetland. This upland area, however, will be graded and paved in a manner that directs surface water (stormwater) away from the wetland and into a detention basin. In addition, although the Service concurs with the assumption in the BA (p. 22) that *most* groundwater recharge on the south side of the Farm Tributary is intercepted by a carbonate aquifer before discharging to the tributary, the existing groundwater contribution to the wetland from the south side, if any, will probably be eliminated by the proposed development.

Increased stormwater flows due to runoff from increased impervious surfaces will accelerate down-cutting of the stream channel running through the main wetland. This, in turn, is likely to promote draining of the wetland. Lower water levels and a reduction of soil moisture due to down-cutting of the stream channel will likely reduce the amount of soft, mucky wetland soils required by bog turtles for hibernation, estivation, feeding, and thermoregulation.

It is anticipated that the increase in impervious surfaces and the surrounding retention walls/embankments will increase the ambient temperature (versus existing vegetation) in the vicinity of the wetlands (BA, p. 39). Higher ambient temperatures will increase evaporation rates, resulting in decreased soil moisture and possibly decreased water levels in the wetland. This would result in a reduction in the amount of wetland area available to bog turtles for estivation during periods of drought and high temperatures.

Changes in Water Quality

Degradation of water quality in the Farm Tributary and main wetland is expected due to sedimentation and other forms of pollution. However, the contribution of sediments and pollutants from impervious surfaces (e.g., parking lots, sidewalks) will be somewhat reduced through redirection of much of the stormwater to the retention basin in the southeastern corner of the project area, downstream of the bog turtle habitat.

Sedimentation could be significant within the main wetland due to the proposed construction of two wetland/stream crossings, particularly if stringent erosion and sedimentation controls are not used. Significant amounts of sediment could also enter the main wetland due to the placement of fill material around the wetland. The steep fill slopes (i.e., 2:1 to 3:1) surrounding the wetland, in conjunction with

no upland buffer, will likely result in erosion of the embankments and deposition of sediment-laden runoff in bog turtle habitat.

Because the mall roads will be open to trucking, hazardous material spills could occur and these substances could enter the wetland and/or stream. In addition, any failure to contain above-ground spills or underground storage tank leaks at the proposed gas station could result in hazardous substances entering the wetland and/or Farm Tributary. Also, normal use and maintenance of the proposed roads and parking lots will add metals, engine oil, gasoline, antifreeze, salt, and other contaminants to stormwater runoff. Entry of contaminants into the main wetland and/or Farm Tributary would be expected to degrade water quality and contaminate wetland soils, placing wetland vegetation, bog turtles, and their prey at an increased risk of mortality.

Changes in Wetland Vegetation

The introduction and spread of invasive native and exotic plant species in the main wetland is anticipated due to soil disturbance and the use of fill containing seeds of such species. This will cause the wetland to become less suitable or unsuitable for bog turtles, since the invasive species will replace plant species (e.g., tussock sedges) and/or the plant community structure (i.e., open, emergent) necessary for nesting and basking. Although several invasive plant species already occur within the action area, and some are found in the main wetland (i.e., multiflora rose, *Phragmites*, red maple, reed canary grass), their accelerated spread into the remainder of the bog turtle habitat is anticipated due to project-associated soil disturbance, changes in wetland hydrology, decreased water quality, and transport by vehicles.

Even with the use of best management practices to control erosion and sedimentation, construction activities in and adjacent to the wetland are likely to cause sedimentation events (BA, p. 37) which will introduce additional mineral sediments into the wetland's primarily organic substrate. This, in combination with a shift in the hydrologic regime in favor of surface water, could cause a shift in the plant community over time toward more mineral sediment-tolerant plant species. In general, this would result in fewer tussock-forming native sedges (*Carex sp.*), and cause invasive grasses (e.g., cattail, reed canary grass, *Phragmites*) that are tolerant of sedimentation and other disturbance to become a major part of a wetland community (BA, p.24). Unless considerable precautions are undertaken during site construction, and adequate upland buffers around the wetland are provided, we expect that the introduction and spread of invasive native and exotic plant species will eventually cause the wetland to become less suitable or unsuitable for bog turtles.

Anticipated Effects Due to Project Operation and Maintenance

Increased Risk of Predation

Due to the anticipated generation of food waste from at least two proposed restaurants, along with the presence of numerous trash receptacles, we anticipate a substantial increase in the number of raccoons, skunks, opossums, foxes, rats, mice and feral cats and dogs in and near the action area. Accordingly, increased predation of bog turtle nests, hatchlings and adults will occur. This is likely to result in a population structure skewed toward old adults. The reduction or loss of recruitment may lead to the extirpation of this population, especially considering travel corridors are not conducive to supplementing the population via bog turtle immigration.

Increased Risk of Road- and Parking Lot-related Mortality

Within the action area, Route 10 will be widened, and new access roads and parking lots will be constructed. In general, roads near occupied bog turtle sites contribute significantly to mortality, with the greatest threat being posed by roads adjacent to or through these wetlands. The Farm Tributary (unnamed tributary to East Branch of the Conestoga Creek) flows through the action area, passes under two proposed culverts, and interconnects on-site and off-site wetlands.

As on-site wetlands become degraded and fragmented due to project construction and operation, bog turtles are likely to attempt to disperse from these wetlands in search of better habitat elsewhere. Because bog turtles not only use streams as travel corridors, but also travel overland (BA, pp. 28-31, 33; Carter *et al.* 2000), it is possible that bog turtles will attempt to disperse out of the main wetland in search of food, mates, and better quality habitat by scaling the steep embankment at the western edge of the action area to disperse over Route 10 (R. Brooks, pers. comm.; February 27, 2001). These turtles will be at increased risk of being killed after encountering heavy traffic on Route 10 (BA, pp. 31, 34). Overland dispersal northward may be possible, but northward-dispersing bog turtles are also at increased risk of being killed or injured while crossing the heavily traveled Route 10 (BA, p. 34). Turtles attempting to disperse eastward along the riparian corridor are at risk of becoming trapped and dying while negotiating a riprap-lined stream channel. Eastward-dispersing bog turtles are at risk of being trapped by road curbs near the Pennsylvania Turnpike Interchange, which would prolong their exposure to vehicular traffic (BA, p. 33).

The proposed design includes installing vertical concrete deflectors (minimum 10 inches in height) along the top of the embankment or retaining walls. This measure will lessen mortality by reducing the ability of bog turtles to access, and therefore cross, roads and parking lots. In the long term, however, bog turtles prevented from dispersing from the site may be subjected to take in the form of harm and/or harassment due to project-induced habitat destruction, degradation and fragmentation.

Long-term Effects of Habitat Destruction, Fragmentation and Degradation

The main, 3.139-acre wetland will be fragmented into three segments due to construction of two culverted road crossings. These wetland/stream crossing structures are likely to impede bog turtle movement between the wetland fragments, leading to decreased genetic exchange, decreased

fecundity, and decreased viability of the isolated bog turtle population. In addition, if bog turtles do not or cannot travel between the wetland fragments due to the design of the road crossings, they may be cut off from suitable nesting, hibernating, basking and foraging areas, leading to an increased risk of mortality and decreased reproduction.

The project's anticipated effects on water quality and quantity (as described above) are likely to result in degradation of the turtle's remaining wetland habitat to such an extent that increased mortality and decreased recruitment (due to reproduction) will occur. For example, over-wintering bog turtles are often in the vicinity of underground springs and groundwater flow to avoid freezing. If groundwater flow at or in the vicinity of hibernacula is disrupted, intercepted or eliminated, turtles may perish due to freezing, desiccation or asphyxiation. Changes in wetland hydrology are also anticipated to alter wetland vegetation, encourage the spread of invasive native and exotic plant species, and reduce soil moisture, thereby reducing available habitat for foraging, basking, nesting, and estivation.

In addition, since no buffers are proposed between developed areas and the bog turtle's wetland habitat, therefore, activities associated with ongoing project operation (e.g., trucking, deliveries, traffic noise, etc.) may disturb or otherwise harass bog turtles.

Summary of Effects

On page 43 of the BA, the applicant's consultant summarizes the multiple, additive and cumulative effects on the bog turtle and its habitat as a result of construction, operation and maintenance of the proposed project as follows:

Presently, the on-site wetlands are in relatively moderate condition and somewhat buffered from upland activities. Temporary construction activities and installation of permanent structures in and around the wetland are likely to have profound effects on the wetland and its denizens, especially since no upland buffers can be accommodated and two wetland crossings are required by the proposed project. The wetland crossings alone represent a significant short and long-term disruption to undoubtedly the best bog turtle habitat on the property. If the bog turtle colony is small, the loss of even a few adults during temporary construction activities is likely to have significant repercussions. The potential loss of nesting or overwintering habitat, either directly (wetland crossings) or indirectly (hydrological changes, spread of invasive plants) is also a possibility. Loss or degradation of overwintering areas would be especially disastrous.

The proposed project will result in the take of bog turtles and the destruction, degradation and fragmentation of bog turtle habitat. This take will occur due to development in and adjacent to bog turtle habitat, which will not only directly kill, injure, harm and harass bog turtles, but will also result in

short- and long-term changes in habitat quality (e.g., wetland vegetation, water quality, wetland hydrology). Over time, this project is likely to result in the extirpation of this bog turtle population.

CUMULATIVE EFFECTS

At 50 CFR 402.02, “cumulative effects” are defined as those effects of future State or private activities, not including federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Endangered Species Act. No cumulative effects are foreseen or have been evaluated for the proposed action.

CONCLUSION

After reviewing the current status of the bog turtle, the environmental baseline for the action area, and the effects of the proposed strip mall and Route 10 construction, operation, and maintenance, it is the Service’s biological opinion that the Tri-County Mall project as proposed is not likely to jeopardize the continued existence of the northern population of the bog turtle. No critical habitat has been designated for these species; therefore, none will be affected.

The Service has based this determination on the relatively few bog turtles that are likely to be killed or injured during construction of the road crossings (two to six), in conjunction with the moderate amount of incremental mortality anticipated in the future. However, over the life of the project, the expected increased mortality within the action area from project-induced road kills, increased predation on eggs and young turtles, loss and degradation of habitat quality due to changes to wetland hydrology, and a shift in plant species composition toward unsuitable habitat are expected to eventually (i.e., within 10 to 20 years) cause the extirpation of this bog turtle population.

The project site supports the only known bog turtle occurrence in the upper Conestoga River watershed; however, it is one of 360 known extant bog turtle populations range-wide. Due to the limited habitat available to this population, the quality of the habitat, influences from surrounding land use, and the isolation of the population, the long-term viability of this population is not assured, even in the absence of the proposed project. Therefore, the Service has determined that the proposed action, including full implementation of the proposed off-site conservation measures, will not appreciably reduce the likelihood of survival and recovery of the northern population of the bog turtle.

If fully implemented, the proposed off-site conservation measure will minimize threats to the species elsewhere in Pennsylvania. By securing long-term protection of an extant population in a watershed that contains multiple, viable occurrences of bog turtles in a wetland system that is relatively pristine and

dynamic, the proposed measure may slow the decline of the northern population of the bog turtle and increase the likelihood of recovery from its threatened status.

Based on a review of the current status of the species' reproduction, numbers and distribution range wide, the Service concludes that the aggregate effects of the proposed construction, operation, maintenance, of the shopping center and Route 10 improvements are reasonably likely to result in the extirpation of the bog turtle population within the action area. However, provided there is full implementation of the proposed off-site conservation measures, the proposed action is not likely to appreciably reduce the likelihood of the survival or recovery of the northern population of the bog turtle.

INCIDENTAL TAKE STATEMENT

Section 9 of the Endangered Species Act, as amended, and federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering.

In accordance with the regulations governing section 7 consultation (50 CFR part 402), the Service is charged with issuing a biological opinion indicating whether or not the proposed action is likely to jeopardize the continued existence of listed species. In those cases where the Service concludes that an action (or the implementation of any reasonable and prudent alternatives) and the resultant incidental take of listed species will not violate section 7(a)(2) of the Act, the Service provides an "incidental take statement" with the biological opinion. The incidental take statement exempts the take anticipated as a result of the action. As defined in regulation, "incidental take" refers to takings that result from carrying out an *otherwise lawful* activity conducted by the federal agency (e.g., the Corps) or applicant.

In light of the issuance of two pre-denial letters for the subject application by the PADEP, and the PADEP's statements at meetings that issuance of the subject permit would be contrary to Chapter 105 regulations protecting Exceptional Value wetlands (see further details in the "Consultation History" portion of this biological opinion), it is our understanding that the PADEP may not issue a permit for the subject action. If this is the case, implementation of the proposed action (i.e., without the benefit of a permit) would *not* be "otherwise lawful." Consequently, any take that would occur due to implementation of the proposed action would not constitute "incidental" take, and therefore would *not* be exempt from the section 9 prohibitions of the Endangered Species Act.

Issuance of a Department of the Army permit is contingent upon authorization/certification of the project by PADEP, and adequate demonstration that the proposed project is in compliance with the 404(b)(1) Guidelines. If the PADEP fails to permit the subject action, it cannot be legally permitted by the Corps. In addition, at the time formal consultation was initiated, the applicant had not demonstrated to the Corps' satisfaction that no on- or off-site alternatives were available to minimize the anticipated adverse effects of the action. If the proposed action fails to comply with the 404(b)(1) Guidelines, issuance of a section 404 permit is also unlikely.

It is also our understanding that this project may require a Special Permit from the Pennsylvania Fish and Boat Commission under 30 Pa. Code §2305 (relating to threatened and endangered species) due to the anticipated take of a State-listed endangered species (i.e., the bog turtle). Under Title 58 (§75.4) permits for the take of threatened and endangered species are issued only upon showing of unique or extraordinary circumstances justifying the permit, and the demonstration that the permitted action does one of the following: 1) has no demonstrable adverse impacts on the population of the species in the Commonwealth; 2) is in the best interest of the protection, conservation and management of the species; or 3) is necessary and appropriate in the interests of public health and safety or promotes essential research or public education and information. Considering the scope, scale, and anticipated adverse effects of the proposed action, issuance of a permit by the Pennsylvania Fish and Boat Commission is in question.

Because incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an *otherwise lawful* activity, this Incidental Take Statement is valid only upon receipt by the applicant of appropriate authorization and permits from federal, State and local permitting authorities. This includes, but is not limited to, a permit under section 404 of the Clean Water Act from the Corps of Engineers, a section 401 Water Quality Certification and Chapter 105 Dam Safety and Encroachment Permit from the PADEP, a section 75.4 Special Permit from the Pennsylvania Fish and Boat Commission, a Highway Occupancy Permit and Signal Permit from PennDOT, an approved Erosion and Sedimentation Control Plan from the Berks County Conservation District, and all other permits and authorizations required by Caernarvon Township and Berks County, Pennsylvania. Because the issuance of one or more of the above permits is in question, it is incumbent upon the Service to make it clear to the Corps and the applicant that this incidental take statement (along with its exemption from the section 9 prohibitions of the Endangered Species Act) is valid *only* upon receipt of all required permits.

Under the terms of section 7(b)(4) and section 7(o)(2) of the Endangered Species Act, taking that is incidental to and not intended as part of the agency action is not considered to be a prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any permit issued for the exemption in section 7(o)(2) to apply. The

Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions, or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps or applicant must report the progress of the action and its impacts on the species to the Service as specified in the incidental take statement [50 CFR 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

Incidental take of bog turtles is expected to be in the form of killing, injuring, harming or harassing during project construction, operation and maintenance. The actual level of incidental take will be difficult to detect or quantify for the following reasons: 1) individuals (juveniles and adults) of this species are small, 2) bog turtles will likely exhibit predator-evasive behaviors (e.g., burying themselves in the substrate during construction, making them difficult to locate; and 3) finding dead or injured specimens is unlikely due to the nature of construction activities in the project area.

To further clarify and encompass all levels of take (direct and indirect), the Service is providing the following narrative statements:

Take During Construction

- Due to the bog turtle's cryptic coloration, small size, secretive nature, preference for dense vegetation, and predator-evasive behavior, the Service anticipates that one to four bog turtles may be overlooked during the removal of turtles from the affected wetland areas prior to the start of construction. Bog turtles missed during these searches are likely to be crushed or buried during construction of the two stream/wetland crossings. If the fences erected around the construction sites are not properly maintained to keep turtles from reentering those areas, additional turtles may be killed.
- If the fences erected around any of the upland construction work areas are not properly maintained to keep bog turtles from entering those areas, bog turtles that are attempting to disperse from wetlands due to project-associated harassment and/or in search of food, mates, or basking areas will likely be killed or injured by machinery and/or crushed by under heavy equipment if they enter construction work areas.
- Due to the increased potential for bog turtles to attempt to disperse out of the action area (i.e., due to construction-related disturbance), and the proximity of several roads to occupied bog turtle habitat, the Service estimates that two turtles will be killed or injured trying to disperse from the action area. This take would likely occur due to increased road kills of bog turtles accessing Route 10 by steep embankment, turtles being trapped

by roadway curbing at the Pennsylvania Turnpike Interchange, turtles being trapped by riprap-lined stream channels and outfall areas, and increased exposure of turtles to predation.

- Due to the close proximity of construction activities to bog turtle habitat, construction activities will likely disrupt normal feeding, breeding, basking, and sheltering behaviors to such an extent that all turtles in the action area will be harmed or harassed.
- The relocation of turtles during the search and removal activities may also affect their behavior, and have some unmeasurable effect on survival.
- Blasting may alter fracture patterns in the bedrock on the south side and affect flow paths of groundwater. Spring water intercepted and redirected away from the hibernation area could result in the death of brumating bog turtles by freezing, asphyxiation or desiccation.
- The spill or release of petroleum products or other hazardous substances into the wetland during construction could result in the death or injury of bog turtles.
- The discharge of large amounts of sediment in the wetland and/or stream during construction could result in the death or injury of bog turtles by smothering, suffocation or asphyxiation.

Take During Maintenance and Operation of the Mall (Approximately 20 Years)

As reflected in the “Effects of the Action” section, the proposed action is likely to cause significant long-term degradation of bog turtle habitat due to the project’s anticipated effects on wetland hydrology, vegetation, continuity, water quality and predator densities. These effects are likely to result in harm and harassment to most or all of the bog turtles in the action area. The Service anticipates that project impacts is likely to cause the extirpation of this population in the next 10-20 years.

- Due to the increased potential for bog turtles to attempt to disperse out of the action area (i.e., due to habitat loss, degradation and fragmentation), and the proximity of several roads and parking lots to occupied bog turtle habitat, the Service estimates that two turtles will be killed or injured annually trying to disperse from the action area. This take would likely occur due to increased road kills of bog turtles accessing Route 10 by the steep embankment, turtles being trapped by roadway curbing at the PA Turnpike Interchange, turtles being trapped by riprap-lined stream channels and outfall areas, and increased exposure of turtles to predation.

Take Summary

The Service estimates that two to six bog turtles will be killed or injured during construction, and that most or all of the bog turtle population will be harassed during construction. During project operation, we estimate that two bog turtles will be killed or injured annually while attempting to disperse from the project area or leave their wetland habitat. In addition, during project operation, we anticipate that an

unquantifiable number of bog turtles will be harmed due to direct and indirect project impacts. Over the estimated 20-year life of the Tri-County Mall project, the additive effect of this take (e.g., due to increased predation, reduced habitat value, and road kills) will likely result in the extirpation of this bog turtle population.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that the anticipated take, either by harm or harassment, or adult or juvenile mortality, is not likely to result in jeopardy to the northern population of the bog turtle.

REASONABLE AND PRUDENT MEASURES

Many of the reasonable and prudent measures and terms and conditions below were proposed by the applicant as project conservation measures. Others have been added by the Service, and involve only minor changes to the project in order to reduce and monitor take. These measures are consistent with the proposed action's basic design, location, scope, duration and timing. The applicant has only provided very limited information to the Service regarding the feasibility of on-site alternatives that would minimize adverse effects to the bog turtle and its habitat. Such information included an evaluation of the economic effects of bridging the wetland and retaining a 100-foot upland buffer around the wetland; however, this information is not complete (e.g., it was not certified by an independent CPA, information about expenses which will be recovered via tax deductions was not included, etc.).

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the bog turtle:

- I. Minimize bog turtle take (i.e., death, injury, harm, harassment) due to construction and operation of wetland/stream road crossings by eliminating one of the proposed wetland/stream crossings, and constructing the other wetland/stream crossing in a manner that minimizes impacts to the bog turtle and its habitat.
- II. Minimize bog turtle take (i.e., death, injury, harm, harassment) due to construction within and near bog turtle habitat by removing bog turtles from construction zones within wetlands, and preventing bog turtle entry into all construction areas.
- III. Minimize harm to bog turtles due to habitat degradation by using best available technology in an attempt to maintain the pre-construction quantity of groundwater and surface water supplying bog turtle habitat.

- IV. Using best available technology, minimize harm to bog turtles due to habitat degradation by minimizing reductions in the quality of groundwater and surface water supplying bog turtle habitat.
- V. Minimize harm to bog turtles due to habitat degradation by preventing and controlling the introduction and spread of invasive native and exotic plant species (e.g., multiflora rose, purple loosestrife, reed canary grass, red maple, *Phragmites*) into wetlands.
- VI. Implement measures to minimize predation on bog turtles and their eggs.
- VII. Minimize bog turtle take (death, injury) due to project operation in and near bog turtle habitat by preventing bog turtles from entering developed areas (e.g., roads, parking lots) within the action area.
- VIII. Implement all project conservation measures (see BA, pp. 43-44; BO pp. 7-9; addendum to BA, pp. 3-4), including, but not limited to, those involving bog turtle habitat conservation.
- IX. Monitor take of bog turtles.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Endangered Species Act, the Corps of Engineers-Baltimore District, must comply with the following terms and conditions, which implement the reasonable and prudent measures described above, and outline reporting/monitoring requirements. These terms and conditions are non-discretionary.

- I Minimize take of bog turtles due to bridge construction by eliminating one of the proposed wetland/stream crossings, and constructing the other wetland/stream crossing in a manner that minimizes impacts to the bog turtle and its habitat.

Bridge construction as proposed using a series of box culverts (or squash pipes) would directly affect an area of wetland at least 50 feet wide by 60 feet long at the upstream crossing, and 50 feet wide by 150 feet long at the downstream crossing location, resulting in the take of bog turtles due to their being crushed, buried, suffocated, disrupted, harmed and/or harassed by the placement of culverts or pipes. Take of bog turtles will also result due to noise, vibration and discharge of sediments from earth-moving activity during construction of the stream/wetland crossings. In addition, long-term harm of bog turtles due to habitat loss, degradation and fragmentation is expected.

The applicant had estimated the cost of two squash-pipe wetland/stream crossings to be approximately \$66,000. No estimate was provided for a box-culvert design; however,

assuming the use of two 5- by 5-foot triple box culverts for the western (4-lane) crossing and two 5- by 5-foot triple box culverts for the eastern (2-lane) crossing, the cost would be \$90,000 per crossing, for a total cost of \$180,000 for both crossings. This design is comparable to the one suggested by the applicant (BA, pp. 36-37). This cost, however, does not include the cost of adding substantial amounts of fill to complete the eastern crossing (at either end of the box culvert span).

A. To minimize take, eliminate one of the proposed wetland/stream crossings.

According to the applicant, the purpose for the second wetland/stream crossing is to provide for access to the site by emergency response vehicles in the event the main entrance is impassable. This second access to the site is a requirement imposed by Caernarvon Township.

Based on the April 4, 2001, comments received from Mr. Tom Yashinsky (applicant's consultant), the "main access must remain in the location shown on the plans approved by the Township (western location)" and this had been confirmed with PennDOT. Apparently, the "eastern" access can remain but cannot be permitted with a traffic signal due to its proximity to the deceleration lane for the Turnpike entrance. Although the Service would prefer that the eastern wetland crossing be eliminated, it is within applicant and Corps discretion to determine which crossing to eliminate.

Rather than constructing the emergency access road across the wetland/stream, construct it along the western portion of the project area to/from Route 10, thereby avoiding all impacts of a second crossing on the Farm Tributary and associated wetlands. This access road should be located at the western property boundary, beginning at Route 10 anywhere between the following approximate locations: 40E 09' 40.33" N / 75E 53' 30.53" W and 40E 09' 45.30" N and 75E 53' 27.78" W. Neither PennDOT nor Caernarvon Township officials object to the relocation of the emergency access. Appropriate signage at both the emergency access road (e.g., "emergency access only") and the main mall entrance (e.g., "mall entrance") should be implemented to maintain desired traffic flows. In addition, a break-away road barrier across the emergency access driveway could be used to discourage unauthorized access. The applicant estimates that construction of the emergency access will cost approximately \$195,000 and result in the loss of 72 parking spaces.

An acceptable alternative to constructing a separate access road (as described above), would be to add a limited access emergency lane to the remaining wetland crossing.

For the one remaining wetland/stream crossing, minimize impacts to the bog turtle and its habitat by implementing an alternative crossing design (in accordance with the

specifications below), rather than the originally proposed squash-pipe crossing design. Only one wetland/stream crossing shall occur, and this crossing shall be located at the proposed western *or* eastern wetland/stream crossing location.

1. If the *western* wetland/stream crossing is selected, it shall be constructed in accordance with one of the following three design alternatives:

Design Alternative 1

Construct a bridge to completely span the main wetland and the Farm Tributary. By bridging the wetland and stream, the existing substrate would remain relatively undisturbed and available to turtles. This structure would significantly reduce take by avoiding the use of fill and equipment in the wetland (thereby avoiding construction-related mortality to turtles within the wetland), allowing free movement of bog turtles within the wetland, and minimizing the likelihood of turtles leaving their wetland habitat and going up onto the roadway, where they would be killed or injured.

The bridge would be a single span of concrete or steel construction, with a minimum span length of 55 feet. Using a planning estimate of about \$170 per square foot for the completed structure, the western (4-lane) crossing would cost about \$500,000 (R. Leary, USFWS Region 5 Chief Engineer; March 21, 2001, memorandum). This planning estimate is comparable to an independent estimate of \$600,000 for a one-span, 4-lane, steel or concrete structure, as provided by PennDOT.

To further minimize take due to construction of this alternative, bridge abutments shall be constructed in uplands as far from the edge of delineated wetlands as possible, and no equipment, machinery or fill material shall enter the wetland at any time.

Design Alternative 2

Construct a series of open-bottom box units (e.g., CON/SPAN® pre-cast concrete arches, Crown-Span® arches or Bebo Bridge) to span the Farm Tributary and main wetland. This structure would allow free movement of bog turtles within their wetland habitat (thereby minimizing harm), and reduce the possibility of turtles leaving the wetland and going up onto the roadway where they could be killed or injured.

The CON/SPAN or Crown-Span arch would provide a more open and better lit area, since the shape has an elliptical or flat slab top, and is not limited to the circular arches of the Bebo technique. Selection of this design alternative would require one foundation element in the wetland. Based on a preliminary estimate by one manufacturer (Bridgetek) for the completed structure, the western (4-lane) crossing would cost about \$380,000. This estimate is based on a maximum 48-foot span element.

To further minimize take due to construction of this alternative, machinery and equipment should operate and travel over timber mats when in the wetland to minimize the compaction of wetland soils. In addition, wetland encroachment should be minimized by carrying out construction activities from either side of the wetland to the maximum extent possible, thereby minimizing work within the wetland.

Design Alternative 3

Construct a series of large, pre-cast or cast-in-place concrete box culverts. This design alternative would require excavation of much of the crossing footprint prior to construction in order to depress the box culverts below grade and provide a natural wetland substrate within the box culvert.

Assuming the use of two 9- by 6-foot triple box culverts (i.e., each of the three cells comprising a single, triple box culvert is 9 feet wide by 6 feet high), the western (4-lane) crossing would cost about \$150,000.

To further minimize adverse effects to the bog turtle and its habitat due to construction of this alternative, the following measures must be implemented:

- C The box culverts to be used for this design alternative shall have individual cells with interior clearance dimensions of at least six feet in height and nine feet in width.
- C Box culverts shall be depressed 10-15 inches below grade. After installation, the original wetland grade shall be re-established within the box culvert using the wetland soils that were removed to allow for box culvert installation. These wetland soils shall be stockpiled on-site, but not within the wetland. Depression of the box culverts shall be done in a manner that allows the development of natural stream banks and bottom under the bridge.

- C To minimize the compaction of wetland soils, construction work in the wetland should be limited to the footprint of the box culverts and a minimal work area on either side of the proposed crossing. Have machinery and equipment operate and travel over timber mats when in the wetland.
- C To the maximum extent possible, carry out construction activities from upland areas on either side of the wetland, rather than in the wetland.

2. If the *eastern* wetland/stream crossing is selected, it shall be constructed in accordance with one of the following design alternatives:

Design Alternative 1

Construct a bridge to span the main wetland and the Farm Tributary. The bridge would be of pre-cast concrete construction, with a reasonable span length limitation of about 55 feet. This technique would require a three-span structure (two foundation elements in the wetland). Using PennDOT's cost estimate of about \$170 per square foot for the completed structure, a 2-lane eastern crossing would cost about \$750,000. PennDOT's cost estimate for a steel or concrete, 1-span, 2-lane bridge is \$650,000 to \$700,000. A 4-lane eastern crossing (which was not proposed by the applicant, but which may be considered by the applicant) would cost about \$1,300,000.

To further minimize take due to construction of this alternative, bridge abutments shall be constructed in uplands and located at least 10 feet from the edge of delineated wetlands. Equipment shall access the crossing area from either side of the wetland only, working towards the central portion of the wetland as construction of the span progresses.

Design Alternative 2

Construct a series of open-bottom box units (e.g., CON/SPAN® pre-cast concrete arches, Crown-Span® arches or Bebo Bridge) to span the Farm Tributary and main wetland. The CON/SPAN or Crown-Span arches would provide a more open and better lit area, since the shape has an elliptical or flat slab top, and is not limited to the circular arches of the Bebo technique. Selection of this design alternative would require three or four foundation elements in the wetland.

Using a preliminary estimate from the manufacturer (Bridgetek) for the completed structure, a 2-lane eastern crossing would cost about \$500,000. A 4-lane eastern crossing (which was not proposed by the applicant, but which may be considered by the applicant if an eastern crossing is selected) would result in a higher cost. These estimates are based on a maximum 48-foot span element.

To further minimize take due to construction of this alternative, machinery and equipment should operate and travel over timber mats when in the wetland to minimize the compaction of wetland soils. In addition, wetland encroachment should be minimized by carrying out construction activities from either side of the wetland.

3. Because any of the above design alternatives would directly eliminate or shade out wetland vegetation (thereby degrading bog turtle habitat), the amount of wetland vegetation that will be lost using the design alternative selected shall be estimated, and then actually measured one and two years post-construction. Results shall be reported to the Service.
4. To minimize take of bog turtles, construction of the selected design alternative shall be completed in one construction season (approximately April to November during the same calendar year). In addition, all utilities shall be attached to the bridge span or installed simultaneous with the wetland/stream crossing to minimize wetland impacts and reduce the need for multiple pre-construction bog turtle surveys.

II. Minimize bog turtle take due to project construction by removing bog turtles from construction zones within wetlands, and preventing bog turtle entry into all construction areas.

A. Pre-construction bog turtle surveys shall be conducted as outlined below.

1. Conduct pre-construction surveys (beginning between May 2 and May 16, 2001) of all wetlands within the action area that will be subject to construction-associated disturbance or encroachment, including the main (Farm Tributary) wetland, and Wetlands 1, 2, 3 and 4. Survey proposed construction impact areas for bog turtles and eggs.
2. A qualified bog turtle surveyor(s) shall conduct these surveys in accordance with a Service-approved plan. This survey and relocation protocol shall be submitted to the Service for review and approval at least five working days prior to conducting the surveys. The protocol shall detail procedures for

conducting searches, handling turtles, and collecting and reporting data. Information to be reported includes, but is not limited to: names of site investigators; weather conditions; number and description of bog turtles captured; micro-habitat where turtles were found; and additional reptiles and amphibians observed. Completed data forms will be forwarded to the Service.

3. The portion of the main wetland that will be subject to construction-associated disturbance or encroachment shall be isolated from the remainder of the wetland using erosion and sedimentation (E&S) control fencing as described below (see Term and Condition II.A.4-6). However, prior to installing the E&S control fence, a bog turtle search shall be conducted (in accordance with the protocol developed pursuant to Term and Condition II.A.2) along the proposed (and marked) alignment of the E&S control fencing, and shall then be conducted within wetland areas isolated by the E&S fencing.
4. The E&S control fence shall be installed on the same day Term and Condition II.A.3 is completed, and the fence buried to a depth of 8-12 inches. This fencing shall be installed in May, prior to construction, and shall remain in place throughout construction of the wetland crossing. The fencing should extend well into the adjacent upland area, preferably encircling the construction zone to prevent bog turtles from moving around the end of the fence into the construction zone.
5. Immediately following installation, the fencing shall be inspected to ensure that no trench (which would act as a pit-fall to trap turtles) occurs on either side of the fencing.
6. Immediately following installation of the E&S fencing, the proposed wetland construction zone isolated by the fencing shall be resurveyed for bog turtles in accordance with the protocol developed pursuant to Term and Condition II.A.2.
7. Data will be collected on each bog turtle (e.g., age, sex, measurements, markings, location, behavior when found) and bog turtle nest (e.g., location, number of eggs) located within proposed wetland construction areas, and reported to the Service. Adult bog turtles will be measured, photographed, PIT-tagged, fitted with radio transmitters, have DNA samples collected, and released into a Service-approved portion of the main wetland in order to monitor take and document bog turtle movement (in accordance with Term and Condition IX). In addition, young bog turtles and eggs will be relocated from

proposed construction zones in accordance with the protocol developed pursuant to Term and Condition II.A.2.

- B. Minimize the likelihood of construction-related bog turtle mortality (i.e., due to turtles leaving the wetland and wandering into upland areas) by installing E&S fencing around the main wetland *prior* to project construction. This fencing shall be installed in the upland approximately five feet from the delineated wetland boundary. The fencing shall be buried to a depth of approximately six inches, and immediately following installation the fencing shall be inspected to ensure that no trench (which would act as a pit-fall to trap turtles) occurs on either side.
 - C. All silt fencing referred to in this Term and Condition shall be maintained, and shall be inspected each work day and after each storm event from April through October each construction season, to ensure that turtles are still unable to cross the barriers. Any breaches in the barrier shall be repaired immediately. A qualified bog turtle surveyor shall search the area within the fence where the breach(es) occurred and submit the survey results to the Service's Pennsylvania Field Office within 48 hours via telephone, facsimile, or e-mail.
- III. Minimize and monitor changes to the pre-construction quantity of groundwater and surface water supplying bog turtle habitat.
- A. Construct stormwater/surface runoff collection structures (i.e., high-tech gutters, underground piping) to reinfiltrate clean roof runoff (i.e., sampled and shown to be free of contaminants) from buildings (i.e., Restaurants A and B) located on the north side of the property. Roof water will be collected, treated and/or filtered, and released into a buried distribution system of pipes to be cooled and infiltrated into the groundwater at appropriate times and in quantities that will attempt to maintain baseline hydrologic inputs (e.g., comparable to pre-project conditions).
 - B. No pavement or parking lot runoff shall be collected and used for groundwater injection to replace natural groundwater recharge. Pavement runoff shall be redirected to the main detention basin located in the southeastern portion of the site. To convey pavement runoff from the north side, span occupied bog turtle habitat by attaching gravity-fed drainage pipes to the proposed western road crossing, or span the Farm Tributary and main wetland with above-ground pipes.
 - C. Continue to use flumes in the stream and wetland to monitor water flow entering and exiting the wetland on a quarterly basis. Continue to monitor groundwater levels using wells in all on-site wetlands and springs. Report results to the Service annually (by

January 1) during and for five years post-construction, and analyze these results in comparison to previous measurements.

- D. Monitor and report the fate of the surface water flowing from the south side annually (by January 1) during and for five years post-construction.

IV. Minimize and monitor changes in the quality of groundwater and surface water supplying bog turtle habitat.

- A. Determine baseline levels of contaminants and monitor water quality in the main wetland and associated springs. To document any project-induced changes to water quality, water samples should be collected and analyzed semi-annually for pH, heavy metals, road salt, and polycyclic aromatic hydrocarbons (PAHs). This should be done during, and for ten years following project construction (i.e., full build out), with results reported to the Service annually. Soil or water concentrations exceeding the EPA aquatic life criteria for any contaminant or pollutant shall be reported to the Service immediately.
- B. Develop and implement an erosion and sedimentation (E&S) control plan prior to construction. The E&S plan is subject to review and approval by the Service. Daily site monitoring will be conducted to ensure plan implementation and to identify any construction-related impacts from sedimentation. Instruct contractors on the importance of ensuring that proper E&S controls are in place at all times.
- C. Conserve a 25-foot upland buffer along the southern edge of the main wetland to reduce the risk of erosion gullies and sediment-laden runoff being washed directly into on-site wetlands. This buffer is defined as beginning at the delineated edge of the wetland and extending to the base of the fill, and applies to that portion of the wetland occurring east of the western wetland/stream crossing (i.e, beginning to the north of the drugstore and continuing to the east).

This will result in the loss of approximately 25 of the 1317 parking spaces proposed for the south side; however, this can be off-set through the addition of approximately 30 parking spaces in the on-site upland area planned for wetland mitigation, for a net gain of 5 parking spaces. As previously discussed with the Corps, wetland mitigation for the proposed project would have a better chance of succeeding if conducted off-site, where surrounding development will not compromise the ecological benefits of the mitigation wetland.

- D. Stabilize the slopes of the fill surrounding the wetland with vegetative matting (e.g., coconut fiber) and non-invasive plant species to minimize the amount of sediment entering the wetland.
- E. Prevent groundwater and surface water pollution during project construction and operation by preventing and containing runoff and materials released from staging areas, parking areas, road crossings, the gas station, and underground storage tanks.

- 1. All staging areas (where construction equipment is fueled, serviced, and stored, and where construction materials are stockpiled) must be kept at least 100 feet away from the main wetland and the Farm Tributary. Staging areas for construction do not include work areas.

Develop and implement a spill avoidance/remediation plan for all staging areas to prevent oil and other hazardous materials from entering wetlands and streams. This plan shall be submitted to the Service for review and approval at least 30 days prior to construction. The Service's Pennsylvania Field Office shall be notified immediately of any spills of hazardous materials via telephone (814-234-4090) or facsimile (814-234-0748).

- 2. Develop and implement a hazardous waste spill (e.g., fuel, oil, lubricants, power steering and brake fluids, ethylene glycol, battery acid) prevention plan for the action area to ensure that spills are prevented and remediated during project operation. Prepare a contingency remediation plan to contain and clean spills that may occur at the road crossings, parking areas and gas station. This plan shall be submitted to the Service for review and approval at least 30 days prior to construction. The Service's Pennsylvania Field Office shall be notified immediately of any spills of hazardous materials via telephone (814-234-4090) or facsimile (814-234-0748).
- 3. Prior to installation of underground storage tanks associated with the proposed gas station on the north side, an inspection form must be submitted to the Service and Pennsylvania Fish and Boat Commission, along with all other relevant documentation. Relevant documentation includes manufacturer's checklists and tightness test results. Deficiencies must be corrected prior to operation, and any tank handling activities or modifications must be reported and submitted on PADEP's "Aboveground and Underground Storage Tank - Tank Handling Activities Report" (3630-FM-WQ0075 10/95).

Conduct tank and line tightness (precision) test according to the manufacturer's specifications at time of installation. If tank and line tightness test can not be verified, then a tightness test must be completed according to industry practice, for example PEI/RP 100 or as determined by either another installation or leak detection requirement.

All proposed on-site underground storage tanks shall meet all applicable state and federal requirements before operation (e.g., spill prevention, overflow protection, corrosion protection, and leak detection requirements of 40 CFR 280).

- V. To prevent and control the introduction and spread of invasive native and exotic plant species (e.g., multiflora rose, purple loosestrife, reed canary grass, *Phragmites*, red maple) detrimental to bog turtles and their habitat, the following measures (some of which are project conservation measures; BA, pp. 24, 27) shall be implemented. Implementation of these measures is anticipated to reduce the levels of take (e.g., harm) by reducing the likelihood of invasive plant species introduction and spread due to mall construction and operation, and by improving existing habitat to encourage turtles to remain in the wetland instead of attempting to disperse across/into more dangerous areas (e.g., across roads) in search of better habitat.
- A. Prior to bringing in fill from outside the project area, inspect it for evidence of invasive exotic plant species (e.g., leaves, stems, roots), and avoid the use of fill containing such materials. In addition, prior to bringing construction equipment and machinery on-site, inspect for evidence of vegetation and remove from equipment (i.e., place in waste receptacle).
- B. During the 2001 growing season (and preferably prior to construction), determine the type (species) and extent (percent cover) of invasive plant species in the main wetland. This survey shall be conducted by a qualified botanist using an approved protocol. Said protocol shall be submitted to the Service for review and approval at least one month prior to the survey, and be designed to monitor changes in vegetation composition and structure over time (e.g., through use of established survey plots along transects, set photographic points, and line-intercept surveys) in order to fulfill Term and Condition V.B and V.D.
- C. Based on the survey conducted pursuant to Term and Condition V.B, develop and implement a plan to control invasive native and exotic plant species. Based on preliminary surveys done during preparation of the BA, it appears that plant species requiring control include, but may not be limited to, multiflora rose, red maple and *Phragmites*. The control plan shall be submitted to the Service for review and approval within three months of the issuance of this biological opinion. The plan shall

include timing of control measures; a detailed description of how the control measure(s) will be undertaken; a map of the specific area(s) to be treated with respect to the total wetland; the acreage to be treated; safety and expected efficacy of the control measure(s); and follow-up monitoring procedures to measure the percent kill. Control measures shall be implemented in the year 2001 and/or 2002, and shall achieve at least an 80 percent kill of the targeted plant species. If this kill percentage is not achieved, subsequent control measures shall be implemented at the earliest appropriate time (i.e., in 2002 or 2003) to achieve at least an 80 percent kill, if deemed prudent by the Service.

- D. Develop and implement a plan to monitor and control invasive native and exotic plant species during project construction and operation.
1. Monitoring shall be done by a qualified botanist, and shall be conducted annually during construction, and then at two, five and ten years post-construction. Particular attention shall be given to filled areas and areas where the soil has been disturbed, since these are the areas most likely to be colonized by invasive plant species. Reports on the results of the monitoring shall be submitted to the Service for review and comment within three months of each monitoring event, along with a proposed control plan (see Term and Condition V.D.2).
 2. Reports on the results of the monitoring (Term and Condition V.D.1) shall be submitted to the Service for review and comment within three months of each monitoring event, along with a proposed control plan containing the elements detailed in Term and Condition V.C. Control measures shall be implemented within one year of monitoring and shall achieve at least an 80 percent kill of the targeted plant species. If this kill percentage is not achieved, subsequent control measures shall be implemented at the earliest appropriate time to achieve at least an 80 percent kill.
 3. If not done properly, removal of invasive native and exotic plants can result in adverse effects to bog turtles, such as the destruction of nesting or hibernating areas, crushing of turtles by equipment, rutting and compaction of wetland soils, destruction of beneficial vegetation, and exposure of turtles to potentially toxic chemicals. Therefore, plant species control/management plans shall take into consideration radio-telemetry results (Term and Condition IX) identifying particularly important and sensitive portions of the wetland (e.g., nesting and hibernating areas), bog turtle life history and habitat requirements, and the safety and efficacy of the available measures to control target plant species.

VI. Implement measures to minimize predation on bog turtles and their eggs.

- A. Beginning in 2001, locate and monitor bog turtle nests, and control predation on bog turtle nests by constructing predator-proof nest exclosures. Nest locations should be mapped using GPS. All work around nests should be minimized to avoid attracting predators to the nest. By June 1, 2001, submit a plan to the Service (for review and approval) that discusses how nests will be located, monitored and protected.
- B. Minimize anticipated increases in predator densities by ensuring that outdoor waste receptacles that may receive food waste are predator-proof, and ensuring that waste/garbage is collected frequently (at least twice/week) and completely.

VII. Minimize bog turtle take due to project operation in and near bog turtle habitat by preventing bog turtles from entering developed areas (e.g., roads, parking lots) within the action area.

Minimize the likelihood of bog turtles accessing developed areas within the action area (e.g., access roads, driveways, parking areas) by constructing vertical curbing (i.e., minimum 10 inches in height) along the edge of developed areas adjacent to the wetland. Such curbing should also be included on wetland crossing(s), the western side of the western (main) entrance, and adjacent to Route 10 (i.e., along the western edge of the project area). The curbing will essentially ring the wetlands, minimizing the likelihood of turtles entering developed areas, and preventing stormwater discharges into wetlands.

VIII. Implement project conservation measures (see BA, pp. 43-44; BO, pp. 7-9; final addendum to BA, pp. 3-4), including, but not limited to, those involving bog turtle habitat conservation.

In accordance with the terms specified in the February 20, 2001, letter to Michael Templin of Joseph A. Piccone, Inc., from Joseph Hoffman of the Berks County Conservancy, a minimum of one wetland known to be occupied bog turtles (minimum six acres) and additional adequate upland buffer (minimum 300 feet) will be donated to (i.e., transferred to), and managed by the Berks County Conservancy. This will be accomplished via fee-simple title transfer or acceptance by the Conservancy of a Perpetual Right-of-Way and Easement (i.e., permanent conservation easement). This transaction will be completed within three years of the date of this final biological opinion.

IX. To monitor the project's effect on bog turtles and their habitat (i.e., monitor take), and determine the effectiveness of Reasonable and Prudent Measures I, II, V, VI and VII, (and the associated terms and conditions), implement the measures below. These measures are consistent with the proposed conservation measure to intensively monitor on-site bog turtles and their habitat (BA, pp. 37, 43).

- A. By May 14, 2001, submit a draft radio-telemetry study proposal to the Service for review and approval. The objective of the telemetry study is to document habitat use, identify nesting and overwintering areas, determine when emigration and immigration occurs, document injury and mortality due to construction, and document the effect of the wetland/stream crossing on bog turtle movement and habitat use. The proposal shall detail study methods (e.g., turtle capture, marking, and handling procedures; frequency and duration of tracking; habitat variables to be documented; etc.), and data collection and reporting procedures. Tracking of turtles shall begin prior to construction, and shall continue during construction of the wetland/stream crossing and for two years following installation of the wetland/stream crossing. The final protocol shall be submitted to the Service by July 1, 2001.
- B. Beginning in early May 2001 (*prior to construction*), determine the status of the on-site bog turtle population by intensively surveying all wetlands in the action area to capture as many bog turtles as possible. Data on each turtle will be collected and reported to the Service, and each adult bog turtle will be marked (via notched scutes), photographed, PIT-tagged and fitted with a radio transmitter to document take and the effectiveness of the reasonable and prudent measures in minimizing take. From the survey information, provide an estimate of population size, structure and density.
- C. During bog turtle surveys, tissue and/or blood samples shall be collected by a qualified biologist and submitted to the Biological Resources Division of the United States Geological Survey for analysis.
- D. Following the radio-telemetry study, continue to monitor the bog turtle population in the action area every three years for 15 years. Submit a proposal to conduct such monitoring to the Service for review and approval within six months of the issuance of this biological opinion. The monitoring shall employ methods (e.g., mark-recapture) sufficient to provide reliable estimates of population size, density and structure. Survey results shall be submitted to the Service for review and comment, and the survey protocol will be revised as appropriate.
- X. To monitor habitat quality from a landscape-scale perspective, provide the Service with aerial photographs of the entire project area and surrounding area (i.e., within one mile of the action area) as these areas appear in 2001 (i.e., prior to construction). Also, provide the Service with aerial photographs of the action area and surrounding area as they appear at intervals of 5, 10, and 15 years (± 1 year for each photo) post-construction.
- XI. The Pennsylvania Fish and Boat Commission and Service shall be allowed access to the action area at all times to monitor take, monitor project impacts on bog turtles and their habitat,

document compliance with the Terms and Conditions, and salvage/recover dead, injured and at-risk bog turtles.

If deemed prudent by the PFBC and Service, the salvaging of at-risk bog turtles may include the location and removal of bog turtle eggs and juveniles less than two years of age out of the project area. Determining the need for salvaging at-risk bog turtles will be based on monitoring results obtained per implementation of Term and Condition IX. If approved, this could only be implemented by a Service-approved bog turtle surveyor or researcher in accordance with a plan subject to review and approval by the Service. The eggs and young could be used to supplement an existing bog turtle population, or released into an area from which they had been extirpated.

- XII. Care must be taken in handling dead or injured bog turtles that are found in the project area to preserve biological material in the best possible state. In conjunction with the preservation of any dead specimens, the finder has the responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead specimens does not imply enforcement proceedings pursuant to the Endangered Species Act. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure that the terms and conditions are appropriate and effective. Upon locating a dead, injured, or sick bog turtle, notification must be made within 24 hours to:
- < U.S. Fish and Wildlife Service - Region 5, Division of Law Enforcement, 300 Westgate Center Drive, Hadley, Massachusetts 01035-9589 (telephone: 413-253-8343); and
 - < U.S. Fish and Wildlife Service - Pennsylvania Field Office, 315 South Allen Street, Suite 322, State College, Pennsylvania 16801 (telephone: 814-234-4090).

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of threatened and endangered species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

- I. Since much of the groundwater supplying the wetland comes from the north side of the project area, development of this six acres will have adverse effects on the hydrology of the wetland, thereby indirectly degrading and destroying bog turtle habitat. Therefore, to fully minimize impacts to wetlands and bog turtles, we recommend that all proposed development on the north side of the property be eliminated, with the exception of a single access road (including

the bridge and associated abutments and attached utilities) to allow access from Route 10 to the southern portion of the property.

- II. Where opportunities exist, work with landowners, the general public, and other agencies to promote education and information about the bog turtle and its conservation. Assist in the purchase and protection of wetlands within the watershed with known bog turtle populations.
- III. In cooperation with the Pennsylvania Department of Transportation, Pennsylvania Turnpike Commission, and Caernarvon Township, improve bog turtle travel corridors connecting the bog turtle habitat in the action area with potential habitat off-site. Increase the size of culverts and improve culvert design in consultation with the Fish and Wildlife Service, Pennsylvania Fish and Boat Commission, the Pennsylvania Department of Environmental Protection, and the Berks County Conservation District.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any of the above conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the Tri-County Mall Biological Assessment. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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